Do Favorite Movie Stars Influence Adolescent Smoking Initiation?

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Objectives. We sought to determine whether adolescents whose favorite movie stars smoke on-screen are at increased risk of tobacco use.

Methods. During interviews, adolescent never smokers taking part in the California Tobacco Survey nominated their favorite stars. We reviewed popular films released during 1994 through 1996 to determine whether stars smoked on-screen in at least 2 films.

Results. One third of never smokers nominated a star who smoked on-screen, which independently predicted later smoking risk (odds ratio [OR] = 1.36; 95% confidence interval [CI] = 1.02, 1.82). The effect was strong among girls (OR = 1.86; 95% CI = 1.26, 2.73). Among boys, there was no independent effect after control for receptivity to tobacco industry promotions.

Conclusions. Public health efforts to reduce adolescent smoking must confront smoking in films as a tobacco marketing strategy. (*Am J Public Health.* 2004;94:1239–1244)

Adolescents watch an average of 3 movies per week,[1] and cigarette smoking among actors in movies has increased in frequency over the past decade.[2] Several recent observational studies suggest that the apparent product placement of smoking in movies might encourage young people to start smoking.[3–6] Public health advocates are calling for the removal of smoking from movies targeted at children and young adolescents.[7]

Evidence exists that adolescent smoking is partially attributable to aggressive tobacco marketing strategies aimed at youths via popular culture.[8–11] One such strategy is to ensure that stars smoke in popular movies.[12–14] Placing products or brand identifiers in movies is recognized as a standard marketing option to advertise and promote product use.[15] Previously unreleased tobacco industry documents emphasize the value of marketing strong positive images for cigarettes in movies,[12] and, in the 1980s, the chairman-elect of Phillip Morris focused on the need to find more opportunities to portray cigarettes on-screen.[12]

The advertising literature notes that movie product placements are effective if the viewer interprets the brand image according to who the character is and how the brand is used by the character.[16] The perceived optimal (i.e., most expensive) placements are in scenes in which the brand is used by the movie's stars.[17] Examples cited in the literature include the 65% increase in sales of Hershey's Reese's Pieces candy after its use by the main character in the movie *E.T.*[18] and dramatic increases in demand for the BMW Z3 automobile, evident by long waiting lists and the withdrawal of discounts for purchase, following the James Bond character's use of the car in the movie *Goldeneye.*[16,19,20] If on-screen smoking by a main character is associated with initiation of smoking among adolescents, this would indicate credible evidence that placement of cigarettes in movies is a successful marketing strategy to encourage minors to smoke.

We report results from a longitudinal study, conducted between 1996 and 1999, involving a representative sample of California adolescents who were initially aged 12 to 15 years. At baseline, adolescents who reported that they had never smoked were asked to nominate their 2 favorite male and female movie stars. The most popular stars' movies in the 3 years before baseline were reviewed, and whether or not the star smoked on-screen was recorded. Adolescent smoking status was reassessed 3 years later in a follow-up interview.

METHODS

The baseline sample for this study included 3104 never smokers aged 12 to 15 years who were interviewed as part of the 1996 California Tobacco Survey (CTS), a random-digit-dialing telephone survey of households in California. Versions of the CTS have been conducted approximately every 3 years since 1990. After separate funding was obtained in 1999, a letter was sent to each adolescent's original address introducing the follow-up survey. Verbal parental consent was obtained, and a telephone interview was scheduled for the adolescent. Completed follow-up interviews were available for 2084 adolescents (77% of the homes located), or 67% of the original sample.

All surveys were offered in either English or Spanish. Nonrespondents were more likely to be members of non-White ethnic groups (rates of nonresponse were 52.2% among African Americans and 21.6% among non-Hispanic Whites), to report average or below-average performance at school (rates of nonresponse were 49.8% among those who reported average or below-average school performance and 27.2% among those who reported performing better or much better than average), and to have family members who were smokers (rates of nonresponse were 37.2% among those exposed to familial smoking and 29.0% among those not exposed to familial smoking).

The adolescent surveys conducted at baseline and follow-up included questions (described previously[11]) focusing on demographic characteristics, exposure to smoking among family and friends, self-reported school performance, and receptivity to tobacco advertising and promotions. Other measures are described in the sections to follow.

Smoking

At baseline and follow-up, we asked respondents "Have you ever smoked a ciga-

rette?" and "Have you ever tried or experimented with cigarette smoking, even a few puffs?" A negative response to both questions at baseline classified an adolescent as a never smoker and as eligible for this analysis. The outcome in our analysis was any smoking by the follow-up survey, as indicated by a positive response to either of these 2 questions.

Smoking Status of Favorite Star

At baseline, adolescents were asked to name their 2 favorite female and 2 favorite male actors. Using each response as a separate observation, we ranked top 10 favorite male and female actors separately for male and female adolescents.[6] J.M. Distefan viewed all films (n=50) that featured these stars in the 3 years (1994–1996) before the baseline survey and classified each film according to whether or not the star smoked on-screen. As in a previous study of smoking in movies,[5] we conservatively required a star to smoke a cigarette in at least 2 of these movies before we labeled him or her as smoking on-screen.

Parental Disapproval of Smoking

At baseline, adolescents were asked "If you lit up a cigarette tomorrow in front of your parents, how do you think they would react?" Possible responses were as follows: (1) tell you to stop and be very upset, (2) tell you to stop and not be upset, (3) not tell you to stop but disapprove, and (4) have no reaction. Adolescents were also asked to either agree or disagree with the statement "When I'm older my parents won't mind if I smoke." Parental disapproval of adolescent smoking was categorized as adolescents (1) reporting that their parents would tell them to stop and be very upset in response to the first question and (2) disagreeing with the second statement.

Statistical Analysis

The various versions of the CTS involve complex designs that provide population estimates of behaviors and attitudes. Statistical weights account for design constraints and adjust for nonresponse. The 1996 weights were ratio adjusted (so that the group followed would be representative of the full sample and of the population) to the computed totals for all 1996 adolescent respondents (i.e., both followed and not followed) according to gender, age, ethnicity, school performance, and smoking status (any tobacco use in the previous 30 days). Next, these weights were further ratio adjusted to population totals for adolescent gender, age, ethnicity, state region, educational status of head of household, and whether head of household was a father or someone else. Information on population totals was derived from the 1996 Current Population Survey (demographic characteristics), the 1996 US census (county/region estimates), and the 1996 CTS household screener (head-of-household status). The weighted analyses we report allow our results to be generalized to the California adolescent population.

We computed variance estimates and 95% confidence intervals (CIs) using the jackknife procedure.[21] To evaluate demographic differences, we performed modified 2-tailed χ^2 tests.[22] We conducted logistic regression analyses to identify independent predictors of smoking by the time of the follow-up interview among adolescents who, at baseline, reported that they had never smoked. Interactions tested included a 3-way interaction of gender, receptivity to tobacco advertising and promotion, and smoking by a favorite star; 2-way interactions between receptivity and smoking by a favorite star; and interactions of the independent variables with adolescent age and gender. All analyses were conducted with the WesVar PC program,[23] which incorporates the jackknife technique.

RESULTS

On-Screen Smoking Status of Favorite Stars

Table 1 lists the names and movies of the favorite stars of male and female adolescent never smokers (baseline) who smoked on-screen during the period covered by the study. Brad Pitt was the most popular star among girls (nominated by 15%), and 9 of the 16 movies in which girls' favorite stars played a main character were rated PG-13. In the case of boys, only 4 of their favorite stars smoked on-screen; all were female actors, and all were starring in R-rated movies.

Respondents whose favorite stars smoked on-screen (34.6%) were more likely to be girls (39.2% vs 29.9%) and to be in their middle adolescent years (40.7% among those aged 14–15 years at baseline vs 29.5% among those aged 12–13 years at baseline). African American adolescents were less likely (10.5%) to name a star who smoked on-screen than were members of other groups (rates of 35.0% to 40.1%).

Favorite nominated stars who were classified as not smoking on-screen were Julia Roberts (named by 6% of girls and 2% of boys), Michelle Pfieffer (6% of girls and 5% of boys), Tom Cruise (12% of girls and 6% of boys), Tom Hanks (4% of girls and 3% of boys), Arnold Schwarzenegger (0% of girls and 12% of boys), Jim Carrey (3% of girls and 12% of boys), and Mel Gibson (4% of girls and 3% of boys).

Receptivity to Tobacco Advertising and Promotions

Since movie product placement is a tobacco marketing strategy, we compared receptivity to tobacco industry advertising and promotions with smoking on-screen on the part of adolescents' favorite actors (Table 2). In general, boys were much more likely than girls to be highly receptive to tobacco industry advertising and promotions. In the case of both genders, those who were minimally receptive to tobacco industry advertising and promotions were less likely to have favorite stars who smoked on-screen. Boys (but not girls) who were highly receptive to tobacco industry advertising and promotions were more likely to have a favorite star who smoked on-screen (36.5% vs 23.3%). The differences in adolescents' responses to the different marketing strategies according to gender suggested that interactions of influences on smoking initiation should be examined in the multivariate analysis.

Predicting Smoking at Follow-Up

Table 3 presents the results of the logistic regression analysis designed to identify predictors of smoking by the time of the follow-up interview among adolescents who were never smokers at baseline. Never smokers who had friends who smoked were approximately twice as likely to have smoked by the follow-up interview as those who reported no smoking among family or friends. Adolescents who were highly receptive to tobacco adver-

TABLE 1—Top 10 Favorite Film Stars and Titles of 1994–1996 Movies in Which They Smoked, by Popularity Among 12- to 15-Year-Old Adolescents: California, 1996

	Sample, No. (%)	Movie(s) in Which Actor Smoked (MPAA Rating)
Adolescent girls (n = 1040)		
Brad Pitt	159 (15.1)	*Legends of the Fall* (R)
		Sleepers (R)
Sandra Bullock	140 (12.2)	*In Love and War* (PG-13)
		The Net (PG-13)
		Speed (R)
		A Time to Kill (R)
Leonardo DiCaprio	100 (9.0)	*The Basketball Diaries* (R)
		Marvin's Room (PG-13)
		Romeo and Juliet (PG-13)
Winona Ryder	54 (4.7)	*How to Make an American Quilt* (PG-13)
		Reality Bites (PG-13)
Demi Moore	49 (4.3)	*The Juror* (R)
		Now and Then (PG-13)
Drew Barrymore	27 (2.3)	*Bad Girls* (R)
		Batman Forever (PG-13)
		Boys on the Side (PG-13)
		Mad Love (PG-13)
Adolescent boys (n = 1044)		
Pamela Anderson	121 (13.1)	*Barb Wire* (R)
		Best of Pamela Anderson (not rated)
Sandra Bullock	101 (8.9)	*In Love and War* (PG-13)
		The Net (PG-13)
		Speed (R)
		A Time to Kill (R)
Demi Moore	57 (4.7)	*The Juror* (R)
		Now and Then (PG-13)
Sharon Stone	38 (3.6)	*Casino* (R)
		Diabolique (R)
		Intersection (R)
		The Quick and the Dead (R)
		The Specialist (R)

Note. MPAA = Motion Picture Association of America. All percentages are weighted and adjusted for sampling design and nonresponse. Percentages do not sum to 100% because only stars who were classified as having smoked on-screen are listed.

tising and promotions were twice as likely as those who were minimally receptive to have smoked by the follow-up interview. Susceptibility to smoking demonstrated its usual independent and significant effect on future smoking (odds ratio [OR]=1.88; 95% CI=1.45, 2.43). Adolescents with a favorite star who smoked on-screen were also significantly more likely to have smoked by the follow-up interview (OR=1.36; 95% CI=1.02, 1.82). A significant interaction was observed between gender and favorite stars' on-screen smoking status (P=.01).

When the multivariate analysis was restricted to girls, having a favorite star who smoked on-screen increased the risk of smoking almost twofold (OR=1.86; 95% CI=1.26, 2.73). Figure 1 (top) displays the effects of favorite star smoking and receptivity to tobacco advertising among girls. Only 20% of adolescent girls initiated smoking if, at baseline, they were minimally receptive to tobacco advertising and their favorite movie star did not smoke on-screen. Conversely, more than 50% of girls who were highly receptive to advertising and promotions and had a favorite star who smoked on-screen initiated smoking. The results for boys, presented in the bottom panel of Figure 1, revealed few differences according to stars' smoking status. When the multivariate analysis was restricted to boys, smoking by the time of the follow-up interview was related to receptivity to tobacco industry advertising and promotions but not to having a favorite star who smoked on-screen.

DISCUSSION

The results of this longitudinal study indicate that smoking by stars in movies significantly increases the risk of future smoking among adolescent girls who have never smoked, independent of effects arising from other tobacco advertising and promotional practices. Adolescent girls who had a favorite star who smoked in movies released between 1994 and 1996, before the baseline survey, had more than 80% increased odds of smoking by the time of the follow-up interview relative to those whose favorite star did not smoke on-screen. The lack of effect among boys (as described subsequently) may, in part, be due to a stronger influence of their receptivity to other tobacco advertising and promotional practices.

There is a considerable literature suggesting that product placement in film is an effective way to promote behavior.[15–17] Substantial increases in sales have accompanied a number of product placements in movies.[15,24,25] The practice of product placement grew rapidly throughout the 1990s and is now common in virtually every big-budget Hollywood film.[26,27] The rapid diffusion of this practice has been attributed to the money that product placements offer movie studios, producers, and directors.[28] While it is compulsory that the tobacco industry comply with demands of the Federal Trade Commission (as per the Federal Cigarette Labeling and Advertising Act) for information on expenditures for product placement in movies, records suggest that no money was spent on these activities throughout the 1990s.[29] However, previously unreleased documents exposed in litigation

TABLE 2—On-Screen Smoking Status of Favorite Stars and Receptivity to Tobacco Advertising and Promotions, by Adolescent Gender (n = 2084)

Level of Receptivity in 1996	Girls, %		Boys, %	
	Favorite Actor Smoked (n = 423)	Favorite Actor Did Not Smoke (n = 617)	Favorite Actor Smoked (n = 308)	Favorite Actor Did Not Smoke (n = 736)
Minimal	6.2	15.2	2.0	8.3
Low	28.1	27.7	15.4	31.7
Moderate	49.3	41.0	46.1	36.8
High	16.5	16.1	36.5	23.3
P	<.01		<.01	

Note. Percentages are weighted and adjusted for sampling design and nonresponse.

TABLE 3—Logistic Regression Analysis Predicting Smoking by the 1999 Follow-Up Interview Among Adolescent Never Smokers at Baseline (n = 2084)

Independent Variable in 1996	No. (%)	Smoking by 1999, OR (95% CI)
Gender		
Female	1040 (29.5)	1.00
Male	1044 (33.7)	1.18 (0.90, 1.56)
Exposure to smokers		
Not exposed to friends or family who smoke	918 (21.7)	1.00
Exposed to family who smoke, but not friends	322 (29.1)	1.34 (0.93, 1.97)
Exposed to friends who smoke, but not family	513 (40.7)	1.99 (1.50, 2.64)
Exposed to both friends and family who smoke	331 (45.8)	2.25 (1.54, 3.28)
Susceptibility to smoking		
Committed never smoker	951 (21.9)	1.00
Susceptible to smoking	1133 (39.2)	1.88 (1.45, 2.43)
Parental disapproval of smoking		
Disapprove	1798 (30.7)	1.00
Do not disapprove	286 (36.1)	0.99 (0.68, 1.44)
Receptivity to tobacco advertising and promotions		
Minimal	177 (19.6)	1.00
Low	563 (24.7)	1.17 (0.69, 2.00)
Moderate	931 (38.9)	1.34 (0.76, 2.35)
High	413 (45.1)	1.99 (1.07, 3.72)
Favorite star on-screen smoking status		
Favorite star does not smoke	1353 (27.6)	1.00
Favorite star smokes	731 (39.2)	1.36 (1.02, 1.82)

Note. CI = confidence interval. Percentages are weighted and adjusted for sampling design and nonresponse. Odds ratios (ORs) are weighted and adjusted for age, ethnicity, school performance, and all of the other variables shown.

against the tobacco industry clearly indicate that the practice occurred.[12]

We classified 41% of girls and 30% of boys in California who had never smoked in 1996 as having a favorite movie star who smoked on-screen. This is a very conservative estimate in that we considered the films of only the most nominated stars; we also required at least one of an adolescent's favorite stars to smoke in at least 2 film releases in the 3 years before the baseline survey before we classified the adolescent as having a favorite star who smoked on-screen. These criteria would be expected to significantly underestimate exposure levels and to bias the analysis toward finding no effect of on-screen smoking among movie stars.

There are several possible explanations for the lack of effect among boys. Although genre was not coded in this study, the lack of effect for boys may reflect gender differences in film genre preferences. Previous research has shown that female adolescents prefer movies characterized as romances/dramas,[30,31] which tend to contain high levels of star smoking,[32] and male adolescents prefer action/adventure films,[30,31] which tend to involve lower levels of star smoking.[32] This effect was also seen in our study. Brad Pitt smoked repeatedly in dramatic films and was nominated by female adolescents, and Pamela Anderson smoked less frequently in an action film and was nominated by male adolescents.

Boys nominated female actors who smoked in R-rated films. Leading female actors are more likely to smoke in films aimed at young audiences (i.e., films rated PG and PG-13) than in R-rated movies.[33] Indeed, some public health advocates have voiced their concern about the high prevalence of smoking in PG-13 movies as a reason for adding smoking to the criteria for rating movies.[34]

The lack of effect seen among boys may also be related to the time period covered by this study. In 1996, the tobacco industry's use of promotional items to promote smoking peaked, before being limited by the Master Settlement Agreement reached between the tobacco industry and the states' attorneys general in 1998. Without the high receptivity to promotional items seen among adolescent boys in 1996, smoking by actors might have been more strongly associated with increased smoking initiation on the part of boys. Conversely, if girls were more receptive to industry promotional activities, the effect of product placement in movies may have been diminished.

At baseline, African American adolescents were less likely than other adolescents to nominate a star who smoked on-screen during the study period, and notably our review did not identify any favorite African American actor who smoked on-screen. This suggests that the tobacco industry was not trying to associate cigarettes with favorite African American actors (Whitney Houston, Wesley Snipes, and Will Smith) during the study pe-

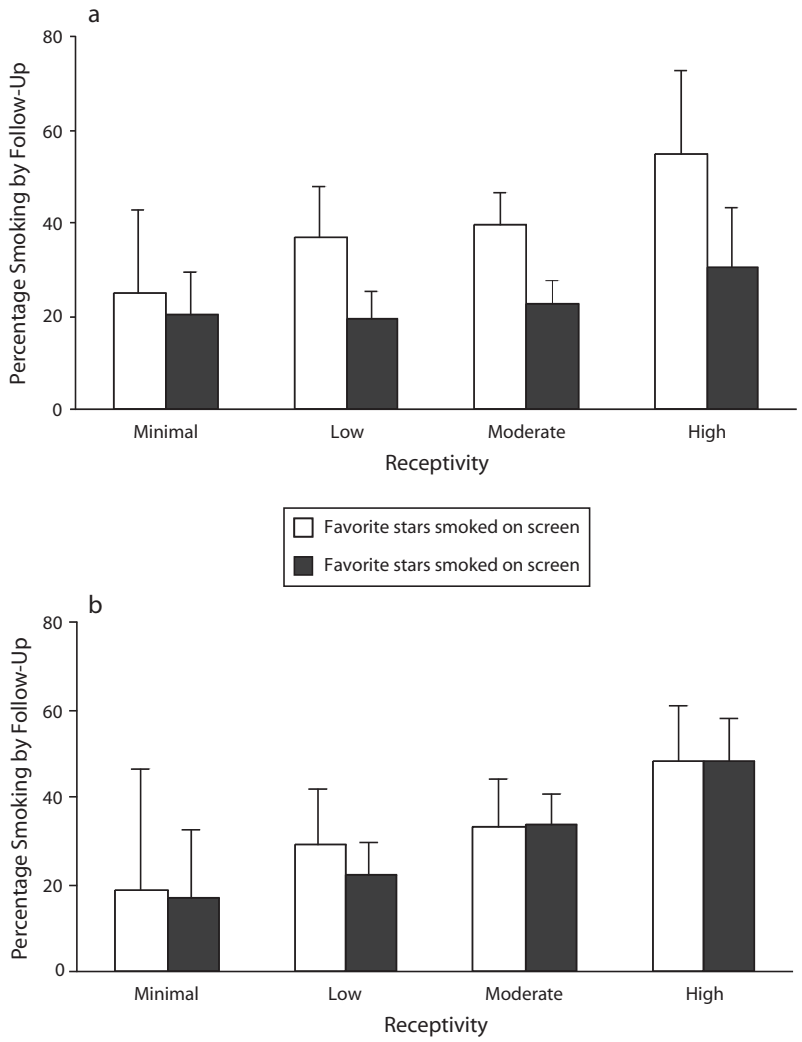

FIGURE 1—Rates of smoking by the 1999 follow-up survey, by baseline (1996) receptivity to tobacco advertising and promotions and favorite stars' on-screen smoking status: California (a) adolescent female (n = 1040) and (b) adolescent male (n = 1044) never smokers.

riod, although soon after this period Will Smith smoked cigars repeatedly in the film *Independence Day*. The study period occurred at the end of more than a decade of declining trends in smoking among African American adolescents.[35]

Limitations

The findings of this study are limited by its response rate. At baseline, we did not seek a commitment to the follow-up study or collect contact information to aid in tracing. Rather, at the time of the second survey, we sought to locate the original respondents and once again obtain parental consent. The vast majority of the nonrespondents did not reside at the same address, and we were unable to locate some of these adolescents. This group differed from respondents at baseline in that they exhibited a higher number of risk factors for later smoking, which would have reduced our study's power to detect associations with smoking onset rather than invalidating positive findings. We examined the effects of on-screen smoking by popular movie stars. It is important that future studies code how actors use cigarettes and that more than one reviewer undertake coding.

Conclusions

This study provides evidence that smoking by movie stars can play an important role in encouraging female adolescents to start smoking. The gender difference in impact of on-screen smoking by favorite actors suggests that more research is needed to identify whether the effect on adolescent initiation is linked to how smoking is portrayed in movies. However, our data strongly suggest that levels of smoking in movies may undermine other public health tobacco control efforts and need to be monitored carefully. Interventions designed to discourage actors from smoking in movies and to limit adolescent exposure to smoking in movies should have a high public health priority. ■

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Contributors

J.M. Distefan performed the analysis for this study, J.P. Pierce created the analysis plan, and E.A. Gilpin reviewed the analysis plan. All of the authors were involved in writing the article.

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Human Participant Protection

This research was approved by the institutional review board of the University of California, San Diego. Also,

informed consent was obtained for the surveys in accordance with the guidelines of that board.

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